

HEALTH MATTERS

Flesh and Bone

Commonly seen in the limbs of large breed dogs, bone cancer can be a bewildering disease for pet owners. Experts at Colorado State University's Animal Cancer Center explain the basics.

Editor's Note:

This article is reprinted at the request of Maureen Andersen and Janette Slusher, in memory of Maureen's dog "Breaker" (right).

"Breaker" was 12 when diagnosed with osteosarcoma in his front leg. Maureen says, "After looking at the x-rays and the biopsy report, we decided it was too late to amputate. We were shattered by the diagnosis. We were fortunate to have him for seven weeks after this."



Understanding Bone Cancer and Lung Tumors in Dogs

Introduction

Approximately 85-98% of bone tumors in dogs are osteosarcomas (osteo = bone, sarcoma = cancer). Osteosarcomas are highly aggressive tumors, characterized by painful local bone destruction and a high rate of spread of cancer cells (microscopic metastases) to distant areas. Osteosarcoma commonly affects the limbs of large or giant breed dogs, but can also occur in other parts of the skeleton (skull, ribs, vertebrae, pelvis). The type of bone tumor, the location (primary site), and whether the cancer has spread (stage) can be helpful information for determining which treatments can help and what type of survival we can expect with different treatments. To find out this information, often various diagnostic tests such as radiographs (X-rays), blood tests, and sometimes a biopsy are required.

Clinical signs

Tumors in the limbs often cause various degrees of lameness and pain, and a firm swelling may become

evident as the tumor size increases. It is common for pain to be intermittent initially, and it may improve initially with pain medications prescribed by your veterinarian. As the degree of discomfort increases, it can cause other signs such as irritability, aggression, loss of appetite, weight loss, sleeplessness, or reluctance to exercise. Some dogs may actually present to the veterinarian as a result of a fracture, due to weakening of the affected bone. Other clinical signs may vary, depending on the primary site and involvement of underlying structures.

Diagnosis and work-up (staging)

Initial evaluation of a dog with a suspected bone tumor often includes: complete physical examination, blood tests, X-rays (of both the affected site and the lungs), bone scan to look for other areas of bone involvement, and sometimes a needle aspirate or a biopsy. Definitive surgery may be performed without a prior biopsy if the age, breed, location, and appearance of the tumor are all very suggestive of osteosarcoma.

The work-up and staging are important for two reasons: it is necessary to determine the tumor type and extent of the cancer, but it also provides the oncologist with information regarding the dog's general health and may identify concurrent medical, bone/joint, or nerve/spinal problems, all of which may influence the treatment recommendations.

Treatment of primary bone tumors

As stated above, the treatment recommendations for bone tumors depend on multiple factors, and a complete physical examination and additional testing may be necessary to accurately determine the most appropriate treatment for an individual dog. Limb osteosarcoma commonly causes lameness and pain because of invasion and destruction of normal bone. These tumors also have a high rate of microscopic metastases (so the dogs commonly develop spread to other areas of the body, such as the lungs, bones, or organs). The two major categories of treatment for limb osteosarcoma are palliative intent treatment (treatments to decrease pain and symptoms) and curative intent treatment (treatments that remove or kill the primary tumor and treat for the microscopic metastases).

Palliative intent treatments can include pain medications alone, palliative radiation treatment, and amputation of the limb. Pain medications alone can help to decrease pain associated with osteosarcoma but will work only for a short period of time (1-3 months) before pain increases and causes a decrease in quality of life. "Palliative" radiation therapy has the potential to significantly improve the degree of discomfort in approximately 75% of dogs, and the pain control lasts for an average of two to four months, at which time it may be repeated. This can be combined with an injectable drug called pamidronate, which decreases bone destruction and has been shown to improve cancer-related bone pain in humans. The average dog with limb osteosarcoma will live

only three to four months if treated with surgery alone as the cells that have spread will continue to grow and cause problems for the dog.

Curative intent treatments to treat the primary site include amputation, limb-sparing surgery, or stereotactic radiation therapy. All of these treatments are followed by a chemotherapy protocol to treat the microscopic metastases (the cells that have spread to other areas in the body). Amputation is a common treatment and is almost always well tolerated by the patient – dogs with three legs can do virtually everything that four-legged dogs can do. The surgery serves two purposes: it removes the primary tumor, which is necessary for cancer control, but it also removes the source of pain, and may therefore dramatically improve quality of life. In patients where surgery is not possible, a conservative and well-tolerated form of radiation therapy can be considered. Limb-sparing surgeries are occasionally possible in dogs that have tumors in close to their wrist (in their distal radius). Recently stereotactic radiation therapy has become available at some institutions. This is a type of high dose radiation therapy that can kill the tumor and save the limb. Occasionally, if the bone is very weak, this is not a good option or the radiation has to be performed in combination with a surgery to stabilize the area and prevent fracture.

All of the curative intent treatments are combined with chemotherapy. Chemotherapy is unlikely to cure most dogs with osteosarcoma but can prolong a good quality life. The most commonly used drug is an injectable medication called carboplatin, which is given once every three weeks for a total of four treatments. Another drug that can be given is doxorubicin, or these chemotherapy medications can be given in combination. No protocol to date has been shown to be more effective than another. Most dogs tolerate chemotherapy well, with some dogs experiencing mild, self-limiting side effects such as depressed appetite, nausea, occasional vomiting, and diarrhea for a few days. Less than

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5% of dogs will experience severe side effects requiring hospitalization. If your dog's side effects are severe and compromise his/her quality of life, the dosages of these drugs can be reduced in the subsequent treatments, or medications can be administered to decrease the side effects.

Following the completion of chemotherapy, we recommend pursuing rechecks every two to three months to ensure that there is no evidence of recurrence or metastasis. The average survival time in dogs with osteosarcoma treated with curative intent treatment (including chemotherapy) is approximately one year; however, 20% of dogs may live longer than two years.

Lung Tumors

Background

Lung tumors are rare in dogs and cats. Like most tumors in animals and people, we do not know why they occur. Tumors typically arise from the glands in the lungs or the lining of the airways. The majority of lung tumors in veterinary medicine result from spread from other primary tumors such as osteosarcoma or hemangiosarcoma or other malignant tumors.

Clinical Signs

The most common presenting complaint for animals with lung tumors is a cough. Sometimes this cough may initially improve with anti-inflammatory medications or bronchodilator drugs. Other signs that can be seen include decreased energy level, difficulty breathing, decreased appetite or weight loss, and occasionally, lameness.

Diagnosis and Initial Evaluation

When a pet comes in with a cough, a number of tests can be performed. The most useful test is usually X-rays of the chest. A lung tumor will often appear as a fairly large, solitary mass in one lung lobe. The most commonly affected part of the lung is toward the back and top of the chest, although tumors can occur in other parts of the lung as well. Some basic blood tests looking at organ function, blood cell number, and any signs of infection or inflammation are also often performed.

Other procedures that may be recommended prior to devising a treatment plan include a fine needle aspirate of the lung mass and/or a CT scan of the chest. A fine needle aspirate allows a small number of cells from the lung mass to be removed and looked at under the microscope. Confirmation of tumor can be obtained in approximately 80% of cases, and the risk of complications from the procedure is low. A CT scan allows the lung tissue and lymph nodes in the chest to be evaluated with very great detail – areas of tumor in other parts of the lung or enlargement of lymph nodes that may not be detectable on plain X-rays can sometimes be identified. This information can be important for some owners, because dogs treated with surgery have a worse prognosis if areas of tumor spread to the lymph node or other parts of the lung tissue is identified.

Treatment and Prognosis

For most cases of solitary lung tumors, surgery is possible to remove the lung lobe containing the mass; however, occasionally if the mass is arising from the origin of the lung lobe (hilus), removal is not possible. The average survival time after surgery is approximately one year. However, the outcome varies considerably depending on:

- The presence or absence of spread to the lymph nodes that

drain the lung tissue; dogs with lymph node involvement live an average of two months with surgery alone, while dogs without lymph node involvement live an average of 15 months, with one-third doing well for more than two years.

- The microscopic appearance of the tumor (histopathology results); dogs and cats with well differentiated tumors are likely to do well for an average of 18 months, whereas dogs and cats with poorly differentiated tumors are likely to develop problems after an average of two months.

For lung tumors where there is a poor prognosis after surgery, chemotherapy can be considered. There are no studies that prove for certain that animals receiving chemotherapy after surgery do better than animals that do not; however, there is encouraging preliminary evidence that the drug Navelbine (vinorelbine) may be helpful in delaying or preventing recurrence of lung tumors after surgery. Navelbine is given as an injection into a vein once weekly for four weeks, then every other week for an additional four treatments. Most pets tolerate chemotherapy very well, with only a small likelihood of developing worrisome side effects.

In cases where surgery cannot be performed or has been declined, we will sometimes consider using chemotherapy with Navelbine or other drugs to try to shrink the tumors and improve clinical signs, or at least keep them from growing for as long as possible.

Follow-up

Following the completion of treatment, we recommend that your pet be seen every three months for additional X-rays of the lungs. If things go well, rechecks are decreased after 18 months to twice per year. Should evidence of tumor regrowth be seen at some point in the future, additional treatment may be considered.

About Colorado State University's Animal Cancer Center

As the largest group in the world studying cancer in pet animals, the Animal Cancer Center evaluates 1500 patients for a primary complaint of cancer and provides 3000 free consultations each year.

The Animal Cancer Center's mission is to improve the prevention, diagnosis, and treatment of cancer in pets, translating their research and knowledge so that it also benefits people with cancer. They offer the latest and most advanced diagnostics and treatments in surgery, chemotherapy, and radiation therapy.

The Animal Cancer Center has trained more surgical, medical, and radiation oncologists than any other veterinary institution. A new PhD graduate degree program in Cancer Biology was recently created within the Cell & Molecular Biology Graduate Program at CSU, the first of its kind in any veterinary school.

The Animal Cancer Center:

- *is one of the few veterinary cancer groups to have over 30 consecutive years of funding from the National Cancer Institute.*
- *personnel have published over a thousand scientific papers in both human and veterinary journals.*
- *personnel present hundreds of hours of continuing education lectures to veterinarians, physicians, and the lay public, per year.*
- *has pioneered numerous surgical, radiation therapy, and chemotherapy procedures for animals with cancer.*
- *is devoted to quality care of the pet and the owner. It has helped to develop one of the first client counseling and pet loss services, known as the Argus Institute.*

For more information, visit www.csuanimalcancercenter.org.

